# Five-Year Review Report
for the

# Interim Remedial Action
at the

## Koppers Co., Inc. (Charleston Plant) NPL Site
## Charleston, Charleston County, South Carolina

**December 2002**

**Prepared By:**

U.S. EPA Region 4
Atlanta, GA

**APPROVED BY:**

**DATE:**

1-10-03

**Winston A. Smith, Director**
**Waste Management Division**
**U.S. EPA - Region 4**
**61 Forsyth Street, SW**
**Atlanta, GA 30303**

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# Executive Summary

The Region 4 Office of the United States Environmental Protection Agency (EPA) issued an Interim Action Record of Decision (ROD) in March 1995 for the Koppers Co., Inc (Charleston Plant) NPL Site in Charleston, Charleston County, South Carolina. The interim remedy was designed to address the principal threats posed by the site in the short-term while a final, site-wide remedy was developed. The primary objective of the interim action was to mitigate off-site migration of nonaqueous phase liquid (NAPL) from the Former Treatment Area to the eastern end of the Milford Street drainage ditch; and to mitigate potential current/future risks posed to human health by exposure to sediments and surface waters of the Milford Street and Hagood Avenue drainage ditches.

Implementation of the Interim Action ROD was performed by Beazer East, Inc. (responsible party, successor in interest to Koppers) under the terms of a May 22, 1995 Unilateral Administrative Order (UAO) with EPA. Construction activities began in June 1996 and were completed in August 1997. The Interim Remedial Action generally consisted of the following components:

- Milford Street Drainage Improvements - Approximately 730 cubic yards (1,025 tons) of material impacted by creosote constituents was excavated from the open Milford Street storm water conveyance and disposed at an off-site Subtitle C landfill (Pinewood, SC). Following excavation, approximately 370 linear feet of the Milford Street drainage ditch was reconstructed by the installation of continuously welded 22 inch HDPE pipe and associated structures.

- Shallow Groundwater/NAPL Collection System - Six shallow dual-phase groundwater/NAPL recovery wells and associated piping networks were installed parallel to Milford Street, to the south of the newly reconstructed drainage conveyance to mitigate off-site migration to the north. Recovered groundwater was pumped to a portable treatment system with ultimate discharge to the North Charleston Sewer District. Recovered creosote was recycled. The shallow groundwater and NAPL collection system continues to operate.

- Storm Drain Improvements - The subsurface storm drain which connects the Milford Street drainage system with the Hagood Avenue drainage system was inspected for integrity and potential for serving as a preferential creosote migration conduit. After evaluating several repair methods, 920 linear feet of RCP drain pipe (sizes ranging from 12" to 36" diameter) was repaired by application of a cured-in-place pipe (CIPP) resin to seal areas of concern.

- Hagood Avenue Drainage Improvements - Approximately 583 cubic yards (1,760 tons) of material impacted by creosote constituents was excavated from the open Hagood Avenue storm water conveyance and disposed at an off-site Subtitle C landfill (Pinewood,

SC). Following excavation, approximately 250 linear feet of the Hagood Avenue drainage ditch was reconstructed by the installation of a poured in place concrete liner with water tight joints.

- Intermediate Groundwater/NAPL Collection System - Two intermediate dual-phase groundwater/NAPL recovery wells and associated piping networks were installed in the Former Treatment Area to evaluate NAPL recovery efficiencies in this primary source area. Recovered groundwater was pumped to a portable treatment system with ultimate discharge to the North Charleston Sewer District. Recovered creosote was recycled. The intermediate groundwater and NAPL collection system continues to operate.

The assessment of this five-year review found that the above remedy components were constructed in accordance with the requirements of the Interim Action ROD. Shallow and intermediate zone groundwater/NAPL recovery wells have been properly operated and maintained since start up in 1997. Potential short-term human health risks posed by exposure to surface waters/sediments of the Milford Street and Hagood Avenue drainage ditches was eliminated by reconstruction efforts. Operational and performance data from the interim system will be used to optimize full scale recovery of groundwater/NAPL pursuant to the requirements of the April 1998 Final ROD. The 90% Remedial Design Report for the full-scale groundwater/NAPL remedy component was submitted to EPA in November 2002 for review and comment.

The other remedy components of the April 1998 Final ROD included excavation and off-site disposal of the most heavily impacted surface/subsurface soils followed by capping relatively less impacted soil, reconstruction of other surface water drainage ditches, sediment capping in the Ashley River and adjacent Barge Canal, and sediment excavation and restoration in the North and South Tidal Marshes. Construction activities have been completed for the above remedy components, with exception of the South Tidal Marsh and the full-scale groundwater/NAPL collection system that is expected to begin in early 2003. An Explanation of Significant Differences (ESD) is pending to document some changes made to the groundwater/NAPL remedy and to the Barge Canal remedial approach. Construction completion for the Koppers Co, Inc. (Charleston Plant) NPL site is targeted for September 30, 2003.

| FIVE-YEAR REVIEW SUMMARY FORM | | |
|---|---|---|
| **Site Identification** | | |
| **Site Name:** Koppers Co., Inc. (Charleston Plant) | | |
| **EPA ID:** SCD980310239 | | |
| **Region:** 04 | **State:** South Carolina | **City/County:** Charleston/Charleston |
| **Site Status** | | |
| **NPL Status:** Final (December 1994) | | |
| **Remediation Status:** Under construction (site wide) & Operating (Interim Remedial Action System) | | |
| **Multiple OUs:** NO | **Construction Complete Date:** 09/30/2003 | |
| **Has site been put into reuse:** YES | | |
| **Review Status** | | |
| **Lead Agency:** EPA | | |
| **Author:** Craig Zeller, P.E. | | |
| **Author title:** Remedial Project Manager | **Author Affiliation:** U.S. EPA - Region 4 | |
| **Review Period:** 10/31/02 to 12/31/02 | | |
| **Date(s) of site inspection:** 11/13/97 (note: date of initial interim action construction certification; site visits conducted routinely since that time.) | | |
| **Type of review:** Post-Sara | | |
| **Review number:** First | | |
| **Triggering action:** Actual RA Onsite Construction | | |
| **Triggering action date (from WasteLAN):** 06/11/1996 | | |
| **Due date:** 06/11/2001 | | |
| **ISSUES:** None | | |
| **RECOMMENDATIONS AND FOLLOW-UP ACTIONS:** Operation, maintenance and monitoring efforts associated with the Interim Remedial Action should be fully integrated into the full-scale groundwater/NAPL remedy. | | |
| **PROTECTIVENESS STATEMENT(S):** The Interim Remedial Action at the Koppers-Charleston, SC plant is adequately protective of human health and the environment in the short-term as potential surface water and sediment exposure pathways have been eliminated. The remaining remedy components of the site-wide April 1998 ROD shall be constructed, and all remedy components shall be properly operated and maintained to ensure adequate long-term protection. | | |
| **OTHER COMMENTS:** None | | |

## I. INTRODUCTION

The purpose of five year reviews is to determine whether the remedy at a site is or is expected to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to CERCLA Section 121 and the National Contingency Plan. CERCLA Section 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with Section 104 or 106, the President shall take or require such action. The President shall report to Congress a list of facilities for which such a review is required, the results of all such reviews, and any action taken as a result of such reviews.*

The Agency interpreted this requirement further in the National Contingency Plan (NCP). 40 CFR Section 300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA Region 4 has conducted a five-year review of the Interim Remedial Action conducted at the Koppers Co., Inc (Charleston Plant) site in Charleston, South Carolina. This review was conducted from October 2002 through December 2002. This report documents the results of the review. This is the first five-year review for the site. The triggering action for this review is Interim Remedial Action on-site construction and mobilization (06/11/1996) as shown in EPA's WasteLAN database. The five-year review is considered necessary due to the presence of creosote constituents and NAPL in groundwater underlying the site that does not allow for unlimited use and unrestricted exposure.

## II. SITE CHRONOLOGY

The following table presents the primary milestones and relevant dates in the site chronology.

| EVENT | DATE |
|---|---|
| Removal Action (Fed-Serv) | March 1985 |
| Removal Action (Peppers/Braswell) | January 1987 |
| Site Inspection | September 1988 |
| Proposed to National Priorities List | February 1992 |
| AOC for Remedial Investigation/Feasibility Study | January 1993 |
| Final to National Priorities List | December 1994 |
| Results of RI and human health BRA to public | January 1995 |
| Public comment period on proposed Interim Remedial Action | January 20 - February 21, 1995 |
| Interim Remedial Action Record of Decision | March 29, 1995 |
| Supplemental groundwater and ecological investigations | March 1995 - May 1996 |
| Interim Remedial Action UAO | May 22, 1995 |
| On-site Interim Remedial Action construction and mobilization | June 11, 1996 |
| Site-wide Proposed Plan released to public | March 1997 |
| Site-wide Proposed Plan public comment period | April 3 - June 2, 1997 |
| Interim Remedial Action physical construction completed | November 13, 1997 |
| Site-wide Record of Decision | April 29, 1998 |
| Site-wide UAO completed/Construction of initial site-wide remedy components begins | January 1999 |

## III. BACKGROUND

This section of the Five-Year Review report provides a brief site background and description of the site characteristics relevant to the stated objectives of the focused Interim Remedial Action.

The approximate 102 acre site is located in the industrialized neck area of northern Charleston, South Carolina on the west side of the peninsula formed by the Ashley and Cooper Rivers. The site is generally bounded by Milford Street on the north, Braswell Street on the south, Interstate 26 on the east and the Ashley River on the west. The formal site boundary also includes a parcel south of Braswell Street which was incorporated to address concerns over historical disposal and dredging activities in a now inactive barge canal. Wood treating operations began at the site in the early 1900's. Koppers Company acquired the property in 1940 and continued wood treatment operations until 1977. The property was sold to Braswell Shipyard in 1978. Koppers' wood-treating operations consisted primarily of treating raw lumber, utility poles and cross ties with creosote. Pentachlorophenol and copper chromium arsenate solutions were also used as preservatives for short periods of time. The majority of wood treating operations were conducted in the eastern portion of the site, now identified as the former Treatment Area.

During the initial phases of the Remedial Investigation (RI), residual creosote contamination was observed in the principal surface water drainage ditches which convey storm water for the watershed. At that time, the site drainage ditches were generally well defined open swales with minimal engineered structures. The Human Health Baseline Risk Assessment was completed in January 1995. Applicable exposure scenarios for the drainage ditches included incidental ingestion and dermal contact with the surface waters and sediments of the Milford Street and Hagood Avenue drainage ditches. Using RI data, Reasonable Maximum Exposure (RME) risks were quantified for the future on-site worker (Milford Street ditch) and current off-site resident (Hagood Avenue ditch). Resultant carcinogenic risks exceeded EPA's established protective risk range, and were estimated at $7 \times 10^{-3}$ for the Milford Street ditch (future on-site worker) and $1 \times 10^{-1}$ for the Hagood Avenue ditch (current off-site resident).

Non Aqueous Phase Liquid (NAPL) transport analysis indicated that the surface water drainage network was facilitating off-site NAPL migration from the former Treatment Area. Boring logs from this area suggested that NAPL migrated northward with groundwater flow and discharged to the unlined Milford Street drainage ditch. NAPL was also observed in the Hagood Avenue drainage ditch that is located approximately 1,000 feet north of Milford Street and the former Treatment Area. Subsequent inspection of the subsurface storm drain system between Milford Street and Hagood Avenue confirmed a completed preferential NAPL transport pathway along a drain line that runs approximately parallel to Interstate 26.

## IV. REMEDIAL ACTIONS

Based upon the above findings and the proximity of the Hagood Avenue drainage ditch to the Rosemont residential subdivision, EPA, the South Carolina Department of Health and Environmental Control (SCDHEC) and Beazer East developed a mutually acceptable Interim Remedial Action to address potential risks posed to human health from off-site NAPL migration. In January 1995, EPA released the results of the RI, the baseline risk assessment, and the proposed interim remedial action to the public. The State of South Carolina concurred with EPA's Interim Action ROD which was finalized on March 29, 1995. The following four

Performance Standards or Response Action Objectives were specified in the Interim Action ROD:

- Eliminate off-site migration of NAPL to the eastern end of the Milford Street drainage ditch;
- Mitigate the drainage system as a conduit for potential NAPL and constituent migration to the Hagood Avenue drainage system;
- Eliminate potential exposure to sediments of the Hagood Avenue drainage ditch; and
- Mitigate off-site migration of NAPL in the intermediate water-bearing unit underlying the former treatment area.

Beazer East has conducted the work required under the Interim Action ROD via a May 22, 1995 Unilateral Administrative Order (UAO) with EPA, as it was agreed that this enforcement mechanism would expedite implementation. Phased construction activities began in June 1996 and physical construction was completed in August 1997. As indicated in the Executive Summary above, the interim response action objectives were addressed by the following construction components:

- Milford Street Drainage Improvements - Approximately 730 cubic yards (1,025 tons) of material impacted by creosote constituents was excavated from the open Milford Street storm water conveyance and disposed at an off-site Subtitle C landfill (Pinewood, SC). Following excavation, approximately 370 linear feet of the Milford Street drainage ditch was reconstructed by the installation of continuously welded 22 inch HDPE pipe and associated structures.
- Shallow Groundwater/NAPL Collection System - Six shallow dual-phase groundwater/NAPL recovery wells and associated piping networks were installed parallel to Milford Street, to the south of the newly reconstructed drainage conveyance to mitigate off-site migration to the north. Recovered groundwater was pumped to a portable treatment system with ultimate discharge to the North Charleston Sewer District. Recovered creosote was recycled. The shallow groundwater and NAPL collection system continues to operate.
- Storm Drain Improvements - The subsurface storm drain which connects the Milford Street drainage system with the Hagood Avenue drainage system was inspected for integrity and potential for serving as a preferential creosote migration conduit. After evaluating several repair methods, 920 linear feet of RCP drain pipe (sizes ranging from 12" to 36" diameter) was repaired by application of a cured-in-place pipe (CIPP) resin to seal areas of concern.

- Hagood Avenue Drainage Improvements - Approximately 583 cubic yards (1,760 tons) of material impacted by creosote constituents was excavated from the open Hagood Avenue storm water conveyance and disposed at an off-site Subtitle C landfill (Pinewood, SC). Following excavation, approximately 250 linear feet of the Hagood Avenue drainage ditch was reconstructed by the installation of a poured in place concrete liner with water tight joints.

- Intermediate Groundwater/NAPL Collection System - Two intermediate dual-phase groundwater/NAPL recovery wells and associated piping networks were installed in the Former Treatment Area to evaluate NAPL recovery efficiencies in this primary source area. Recovered groundwater was pumped to a portable treatment system with ultimate discharge to the North Charleston Sewer District. Recovered creosote was recycled. The intermediate groundwater and NAPL collection system continues to operate.

The groundwater/NAPL recovery system has been properly maintained and operated since physical construction of the interim response action components was completed in August 1997. Monitoring of the system includes measurements of water levels, NAPL thickness, pumping rates and groundwater totalizer readings once a week. Operation and monitoring results are reported monthly to EPA and SCDHEC. Two of the most eastern shallow groundwater/NAPL extraction wells along Milford Street were shut down in mid 1998 due to low groundwater recovery rates and poor NAPL collection. The other 4 existing recovery wells have generally operated at a combined average flow rate ranging from approximately 1.5 to 2.0 gallons per minute (gpm). Total groundwater recovered from the shallow Milford Street recovery wells exceeds 17 million gallons. Total NAPL recovered from the shallow Milford Street extraction wells has been estimated at 3,750 gallons, for an average of 2 gallons of NAPL per day. Groundwater recovery rates for the two intermediate extraction wells are generally lower than the Milford Street system, and are operated approximately at a combined average flow of 0.50 gpm. However, NAPL recovery rates are more prolific. Over 1 million gallons of groundwater have been recovered from the two intermediate wells, generating approximately 10,500 gallons of NAPL. Average NAPL recovery rates for the intermediate extraction system are on the order of 5 gallons per day.

The Interim Action ROD estimated total capital costs at $1,350,000 with annual operation and maintenance costs of $138,000/year. The total present worth for the interim action was estimated at $3,060,000. Actual interim action remedy costs incurred were obtained from Beazer East. Total capital construction costs were estimated at $1,500,000 which included reconstruction of the Milford Street/Hagood Avenue drainage ditches, storm drain rehabilitation, shallow Milford Street extraction wells, intermediate zone recovery wells in the former Treatment Area, and treatment equipment. The operation and maintenance contract has ranged from $135,000 to $150,000 per year for utilities, chemicals, materials, necessary repairs, labor and monitoring efforts.

## V. PROGRESS SINCE THE LAST REVIEW

This was the first Five-Year Review for the site.

## VI. FIVE-YEAR REVIEW PROCESS

The Five-Year Review effort for the Interim Remedial Action at this site primarily consisted of technical document review to ensure the established Performance Standards and Response Action Objectives were achieved. The following documents were reviewed to support preparation of this report:

- Interim Action Record of Decision for the Koppers Co., Inc. (Charleston Plant) NPL Site, Charleston, South Carolina; EPA-Region 4, March 29, 1995.
- Final Documentation Report Interim Remedial Action (Volumes I through XI) Beazer East, Inc., Former Koppers Company Charleston, SC Plant Site; Dames & Moore/Davis & Floyd on behalf of Beazer East, December 30, 1997.
- Interim Remedial Action Monthly Status Reports (Nos. 1 through 89).
- Annual Stormwater Monitoring and Storm Drain Inspection Reports prepared by RETEC.

The initial Interim Action construction certification inspection was conducted on November 13, 1997. Site visits have been conducted routinely since that time during oversight activity associated with implementation of other site-wide remedy components. Additional community involvement activities were not undertaken at this time. However, further dissemination of information to the public is anticipated as part of the construction completion target scheduled for September 30, 2003.

## VII. TECHNICAL ASSESSMENT

As recommended by EPA's Comprehensive Five-Year Review Guidance (OSWER No. 9355.7-03B-P, June 2001), the framework for the technical assessment of the Interim Remedial Action centers around answering the following three key questions:

- *Question A: Is the remedy functioning as intended by the decision documents?*

  Yes. As discussed above, EPA has concluded that all Interim Remedial Action construction activities were conducted in accordance with the March 1995 Interim Action ROD. Potential short term human health risks posed by exposure to surface waters and sediments of the Milford Street and Hagood Avenue drainage ditches have been eliminated due to reconstruction activities. The Milford Street recovery wells and intermediate zone recovery wells in the former Treatment Area have been properly

operated and maintained. Operational and performance data from the interim system will be used to optimize full scale recovery of groundwater/NAPL pursuant to the requirements of the April 1998 Final ROD. The 90% Remedial Design Report for the full-scale groundwater/NAPL remedy component was submitted to EPA in November 2002 and is currently undergoing technical review and comment.

- *Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of remedy selection still valid?*

  Yes. There have been no changes to the exposure scenarios, toxicity data or cleanup levels and established Performance Standards since the March 1995 Interim Action ROD.

- *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

  No.

## VIII. ISSUES

None identified during this Five-Year Review effort.

## IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Operation, maintenance and monitoring efforts associated with the Interim Remedial Action should be integrated fully into the full-scale groundwater/NAPL remedy. Construction activity for the groundwater/NAPL remedy component is expected to begin in Spring 2003.

## X. PROTECTIVENESS STATEMENT

The Interim Remedial Action at the Koppers-Charleston, SC plant is adequately protective of human health and the environment in the short-term as potential surface water and sediment exposure pathways have been eliminated. The remaining remedy components of the site-wide April 1998 ROD shall be constructed, and all remedy components shall be properly operated and maintained to ensure adequate long-term protection.

## XI. NEXT REVIEW

The next Five-Year Review for this site will be conducted for the entire remedy specified in the April 1998 ROD, and according to statutory requirements will be conducted five years from the approval date of this document.